CLAIMS

What is claimed is:

1. An optical membrane device comprising

a support;

a device layer in which a deflectable membrane structure is formed;

a sacrificial layer separating the support from the device layer that is selectively removed to release the membrane structure; and

an optically curved surface on the deflectable membrane.

2. An optical membrane device as claimed in claim 1, wherein the optical surface is formed in an optical element layer that is deposited on the device layer.

3. An optical membrane device as claimed in claim 1, wherein the optical surface is etched into the device layer.

4. An optical membrane device as claimed in claim 1, wherein the optical surface is a concave surface that is etched into the device layer.

5. An optical membrane device as claimed in claim 1, wherein the optical surface is a convex surface that is etched into the device layer.

6. An optical membrane device as claimed in claim 5, wherein the sacrificial layer defines an electrical cavity across which electrical fields are established to deflect the membrane structure in a direction of the support.

7. An optical membrane device as claimed in claim 6, wherein the membrane structure comprises:

a center body portion;

an outer portion, which is at least partially supported by the sacrificial layer; and

tethers that extend between the center body portion and the outer portion.

8. An optical membrane device as claimed in claim 1, wherein the sacrificial layer defines an electrical cavity across which electrical fields are established to deflect the membrane structure in a direction of the support.

9. An optical membrane device as claimed in claim 1, wherein the membrane structure comprises:

a center body portion;

an outer portion, which is at least partially supported by the sacrificial layer; and

tethers that extend between the center body portion and the outer portion.

10. An optical membrane device as claimed in claim 1, further comprising an optical coating deposited over the optical surface.

11. An optical membrane device as claimed in claim 10, wherein the optical coating is multilayer dielectric mirror.

12. An optical membrane device as claimed in claim 1, wherein the optical coating is an antireflective coating.

13. A process for fabricating an optical membrane device, comprising

providing a support;

forming a sacrificial layer on the support;

forming a device layer on the sacrificial layer;

patterning a membrane structure into the device layer;

releasing the membrane structure by selectively removing the sacrificial layer; and

forming an optically curved surface on part of the membrane structure of the device layer.

14. A process as claimed in claim 13, wherein the step of forming the optical surface comprises:

depositing a photoresist layer;

reflowing the photoresist layer to create a curved surface; and

transferring the curved surface into the device layer by etching the photoresist and the device layer.

15. A process as claimed in claim 14, wherein the step of reflowing the photoresist comprising reflowing a columnar photoresist layer to form a convex surface.

16. A process as claimed in claim 14, wherein the step of reflowing the photoresist comprising reflowing a photoresist layer to create a concave surface via surface tension in the reflowed photoresist.

17. A process as claimed in claim 13, further comprising depositing a highly reflective coating over the curved optical surface.

18. A process as claimed in claim 13, further comprising depositing a dielectric mirror coating over the curved optical surface.

19. A process as claimed in claim 13, further comprising depositing an antireflective coating over the curved optical surface.

20. A process for fabricating concave mirror structures, comprising an optical membrane device, comprising

depositing a photoresist layer over a well in a substrate;

transferring curved surface over the well into the substrate by etching the photoresist and the substrate; and

coating a curved surface of the substrate with a dielectric mirror coating.

21. A process as claimed in claim 20, further comprising providing the substrate with the well by forming a patterned layer, in which the well is formed, over a device layer.

22. A process as claimed in claim 20, further comprising providing the substrate with the well by forming the well in a device layer.